Acta Acad. Paed. Agriensis, Sectio Biologiae **XXV** *(2004) 49–57*

New or little known epiphyllous liverworts, XI.
Otolejeunea subana sp. nov. from Madagascar

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The Lejeuneoideae genus *Otolejeunea* Grolle & Tixier was described from Madagascar in 1980, based on *O. moniliata* Grolle. Since 11 other *Otolejeunea* species were described as new or transferred into the genus, a second species from Madagascar, 5 from Southeast Asia (of which 2 proved to be synonyms), 2 from New Guinea, 1 from Australia, 1 from New Caledonia and 1 from Brazil. The new *Otolejeunea subana* Pócs described here raises the number of recognized *Otolejeunea* species to 11 and the number of endemic species known from Madagascar to 3. The new species belongs to subgenus *Allorgella* and seems to be related to *O. rabenorii* Tixier from Madagascar and a less extent to *O. semperiana* (Gottsche ex Steph.) Grolle from Souheast Asia. From both species differs by its shape of the perianth and of female involucre and also from all other species by its special lobule teeth formation and by its areolation with triangular and intermediate cell wall thickenings.

Introduction

Grolle (1985) summarizes the history of the genus based on the parallel description of the related *Otolejeunea* (Grolle et Tixier in Tixier 1980) and of *Allorgella* (Tixier 1980) in the subfamily of Lejeuneoideae within the family of Lejeuneaceae. The type species of the genus *Otolejeunea* is *O. moniliata* Grolle from the Marojezy Massif of northern Madagascar. *Allorgella* Tixier contained 4 new species, with the type of *A. hoana* from Vietnam. Grolle (1985) unified the two genera, considering *Allorgella* only as a subgenus within *Otolejeunea* and describing a new species of this subgenus, *Otolejenea zantenii* Grolle. Transferred *Prionolejeunea semperiana* Gottsche ex Steph. into the genus *Otolejeunea* and synonymised *Allorgella changiana* Tixier with it. At the same time Grolle described an

other subgenus under the name of *Phoxolejeunea*, with a new species, *Otolejeunea streimannii* Grolle. Thiers (1992) added the new *Otolejeunea australiensis* from Queensland and Tixer described *Otolejeunea rabenorii* from Madagascar and *Allorgella schnellii* from Brazil (Tixier 1988, 1991). Zhu & So (1997) recombined the Brazil species, as *Otolejeunea schnellii*, wich was confirmed and fully described and illustrated by Grolle and Reiner-Drehwald (2000). Zhu & So (1998) described *Otolejeunea philippinensis* from the Philippines and synonymized *O. noerteana* (Tixier) J.J. Engel & B.C. Tan with *Otolejeunea semperiana* (Gottsche ex Steph.) Grolle. Finally Grolle and Reiner-Drehwald (2000) provided a key to the 10 hitherto known species.

According to Grolle (1985) the main characters of the genus *Otolejeunea* are the flat perianth with two giant, inflated ears, the one sided innovation of *Pycnolejeunea* type, the hypostatic male branch with only 1(-2) underleaves at its base, the proximal position of hyaline papilla, the leaf lobe and underleaf shape, the two lobed rhizoid initial plate and the evenly incrassated cell walls.

The new species described below possesses all these characters except the evenly incrassated cell walls – it has triangular and sometimes even intermediate thickenings. But this is not a primary character and can develop in most lejeuneaceous groups. I observed trigones also in the cell walls of *Otolejeuna rabenorii* Tixier.

New taxa

Otolejeunea subana spec. nov. (See figures 1-20).

Otolejeuneae rabanorii et O. semperianae similis sed satis differt perianthiis rotunde auriculatis sinu obcordatis, bracteolis breve rotundilobatis sinu angustissimi, bracteis falcatis perianthi 2/3 longis, foliorum lobi brevissime bidentatis. Species nova dedicata ad collegam illustrissimam doctorem Johannum Subam.

TYPUS: Madagascar, Toamasina Province. Mantady Forest Reserve N of Andasibe (Périnet), S 18°50', E 48°28', alt 1030 m., epiphyllous in submontane rain forest. Coll. T. Pócs & A. Szabó 9485/R. Holotypus: EGR.

Pale green shoots 1-1.4 mm wide and 6-8 mm long, creeping or forming small (8–12 mm diameter) patches on living leaves. Stem diameter 50–75 μm, irregularly pinnate, with *Lejeunea* type branches. Stem with two rows of ventral merophytes. Leaves imbricate, spathulate in shape, the leaf bases not covering the stem. Lobe 600–800 μm long and 350–600 μm wide. The antical lobe margin often denticulate (prorate) due to the protruding cross walls of marginal cells. Lobe cells at the middle more or less isodiametric,

hexagonal, 20–25μm in diameter, with small trigones and here and there with intermediate thickenings.

Lobule ovate-lanceolate, approximately twice as long as wide, 240–350 x 120–180 μm, often only in its lower proximal part, inflated. Lobule cells square or elongate quadrangular, 12 x 12–20 μm. Lobule margin in most cases visible and flat. The obsolete lobule teeth, both reduced at the same level, do not really differ from the other lobule margin cells and are recognizable from their position bordering a small, one cell deep incision, with the ovate or sausage shaped hyaline papilla. The latter is fixed to the proximal inner side of the first tooth and is directed in any side.

Amphigastria are circular, the widest at their middle (10–16 cells), with slightly crenulate margin. Underleaf lobes triangular, 4–6 cells broad at their basis with the same length, ending in one rounded or triangular cell, sometimes tipped by a hyaline papilla. Sinus between the lobes quadrangular, V or U shaped, medium to wide. Underleaf base with bilobed rhizoid initial disc and with an almost straight insertion line. Rhizoids densely develop, short, colorless.

Autoecious. Androecium on short lateral branches or among the sterile leaves of the main stem. Consists of 3–6 pairs of hypostatic male bracts, each with one antheridium. 2–3(–5) amphigastria develop on the lower two third of the male branch. Gynoecium on very short branches near the shoot or branch apex, with one *Pycnolejeunea* type innovation. Female bracts falcato-spathulate with obtuse apex, very unequal and asymmetric shaped, each with a spathulate lobule of about its half length. Bracteole ellipsoidal ovate, about 2/3 length of the bracts, with very short lobes of rounded apices and with a very narrow sinus. Perianth more or less inflated, 1 mm long and 0.75 mm wide on its top, together with the large, rounded ears. The sinus between the ears obcordate. Perianth cells in average 30 x 20 μm, but quickly diminishing towards the upper end of the ears. Seta articulate, when mature, 1000 μm long and 30–50 μm thick. Capsule slightly ellipsoid, 250–300 μm wide and 280–320 μm long with -360 μm long segments.

The new species is dedicated to my old friend, Professor János Suba, bryophysiologist, with whom I spent near four decades together at the Botany Department of Eger College, sharing many nice experiences and adventures, always enjoying his kind help and expertise.

The new species is obviously related to some other members of the *Allorgella* subgenus of *Otolejeunea*. The closest relatives seem to be *O. rabenorii* Tixier in Madagascar and *O. semperiana* (Gottsche ex Steph.) Grolle from the Philippines.

Discussion

The new species differs well from both related taxa in the following characters:

Smaller in size than both species (shoots of *O. rabenorii* are 1.6, of *O. semperiana* 1.8 mm wide, the stem of *O. rabenorii* is 100 μm and that of *O. semperiana* ca. 80 μm thick).

The lobules of the new species are much longer, ovato-lanceolate in shape, attaining almost the half lobe length while those of the two related taxa are rounded ovate and short (1/4 – 1/3 o lobe length).

Only *O. subana* has among the three species at least obsolete lobule teeth bordering an incision on the distal third of lobule margin. Only this species has elongated ellipsoid female bracteole with very short, rounded lobes.

Only *O. subana* has a perianth with its rounded ears standing so closely to each other, that the sinus between them became obcordate. This feature is unique within the genus. In addition, the perianth of *O. subana*, together with the large ears, is longer than wide while in *O. semperiana* is wider than long. The perinth mouth in *O. subana* is without a beak while *O. rabenorii* has very long beak.

Phytogeographycally interesting, that only New Guinea and Madagascar have three species together, being diversity centers of the genus. Then both large islands have an endemic subgenus, Madagascar has the representative of subgen. *Otolejeunea*, while New Guinea has that of *Phoxolejeunea*. Indomalesia has four species scattered on a much larger area while only one species is know from the Neotropis. Speculating on the evolutionary trends within the genus, I suppose that subgen. *Otolejeunea* with *O. moniliata* bears most of the ancestral characters, like the vitta and the well developed lobular teeth and hyaline papilla. The habitat preference in *O. moniliata* was not specialized yet, occurring on all substrates, while all other species are quite strictly epiphyllous. Then, after loosing the ocelli, the evolution took place in two directions. In subgen. *Phoxolejeunea* with *O. streimannii* the acute, long lobule tooth became reduced to a short, roundish cell, but still always present. At the same time evolved the perianth with acute lobes. In the other direction subgen. *Allorgella* has evolved, retaining the rounded auriculate perianth and at the same time the lobule structure was reduced at different levels. Only in *O. subana* and in *O zanteni* can still recognise the highly reduced lobule tooth, while in the second species the lobule margin starts to be inrolled and the whole lobule reduced. In *O. rabenorii* the lobule teeth disappear but the lobule margin is still visible. By all other species of the subgenus the lobule margin is fully incurved and teeth and papilla reduced together with the whole lobule. If we accept this evolution process, Madagascar and New Guinea retained the most ancient, less reduced types.

Acknowledgements

The author expresses gratitude towards his colleagues at the Botany Department of Eger College and to Dr. Robert Magill (Missouri Botanical Garden), with whom together we realized the very interesting collecting trip in Madagascar during 1994. He acknowledges with thanks the financial help of the National Geographic Society (USA), sponsoring the trip (Grant No. 5201/94).

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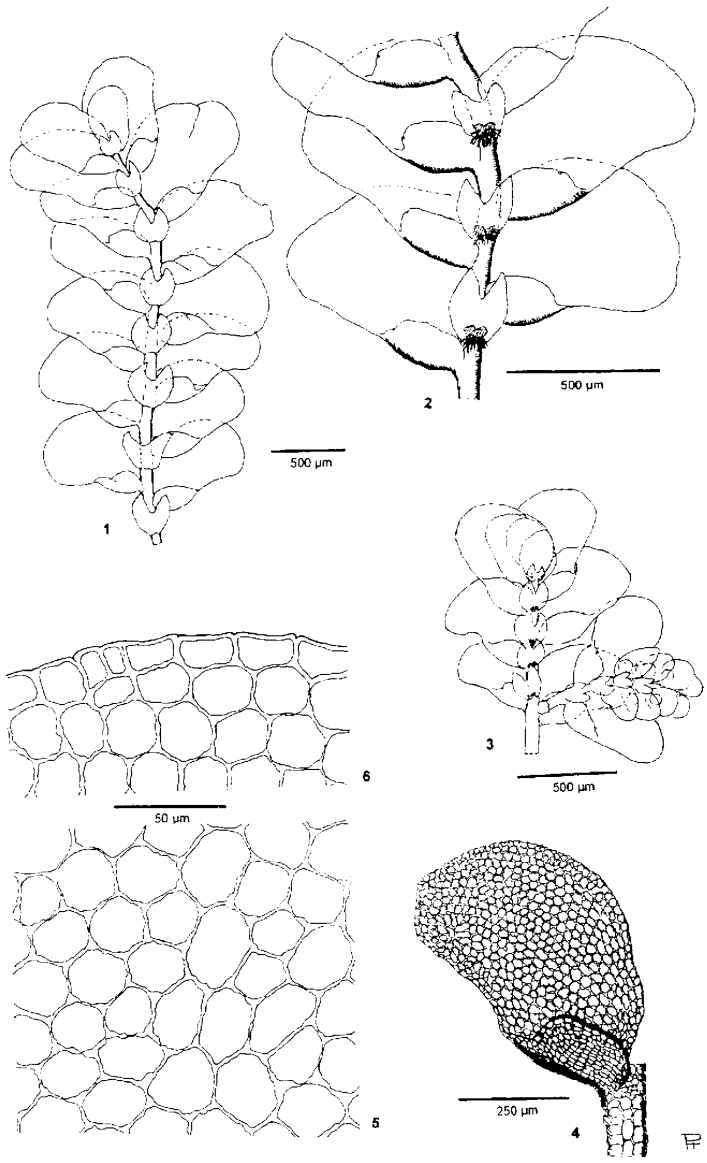

Plate I. *Otolejeunea subana* Pócs. Figs 1-3: habit, ventral view. Fig. 4: one leaf, ventral view. All drawn from the holotype.

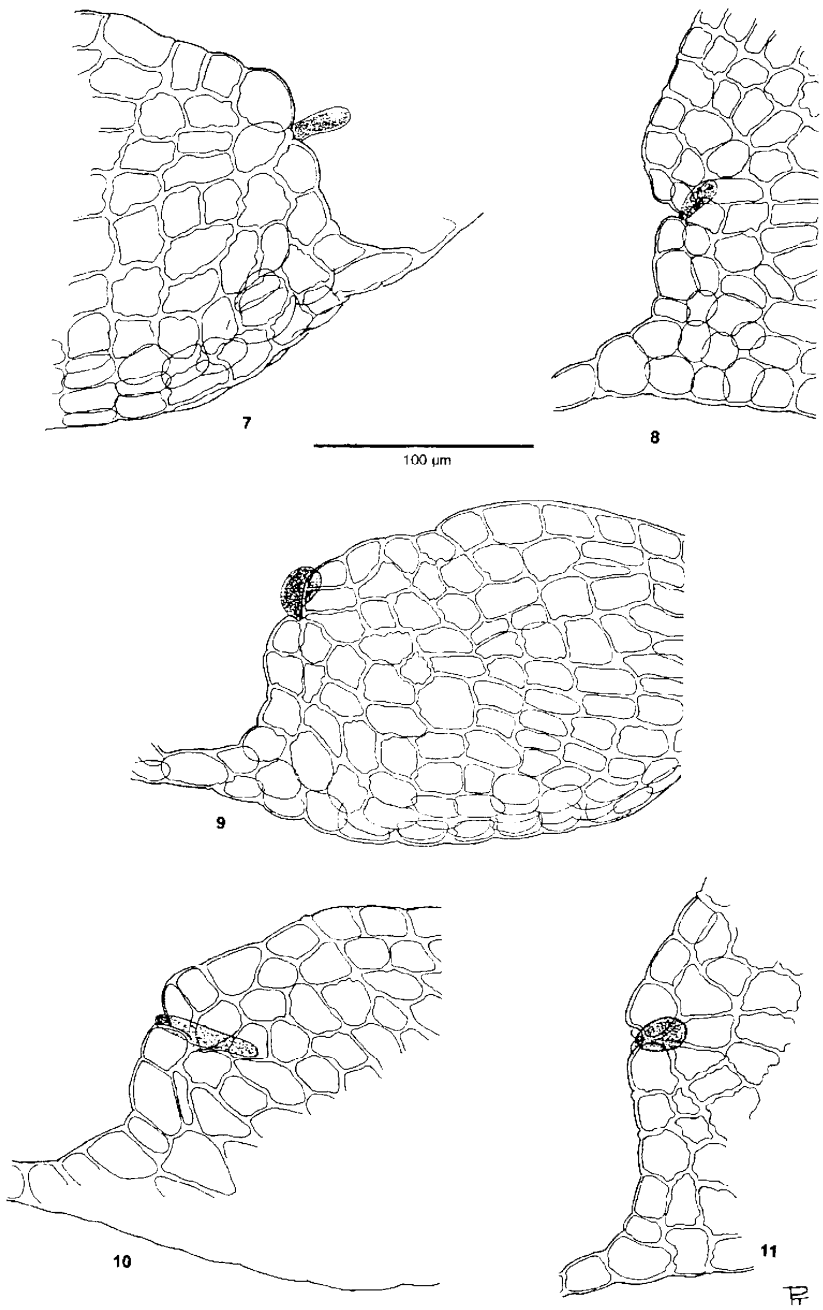

Plate II. *Otolejeunea subana* Pócs. Figs 7-11: Lobules showing the various position of reduced teeth ad hyaline papille. All drawn from the holotype.

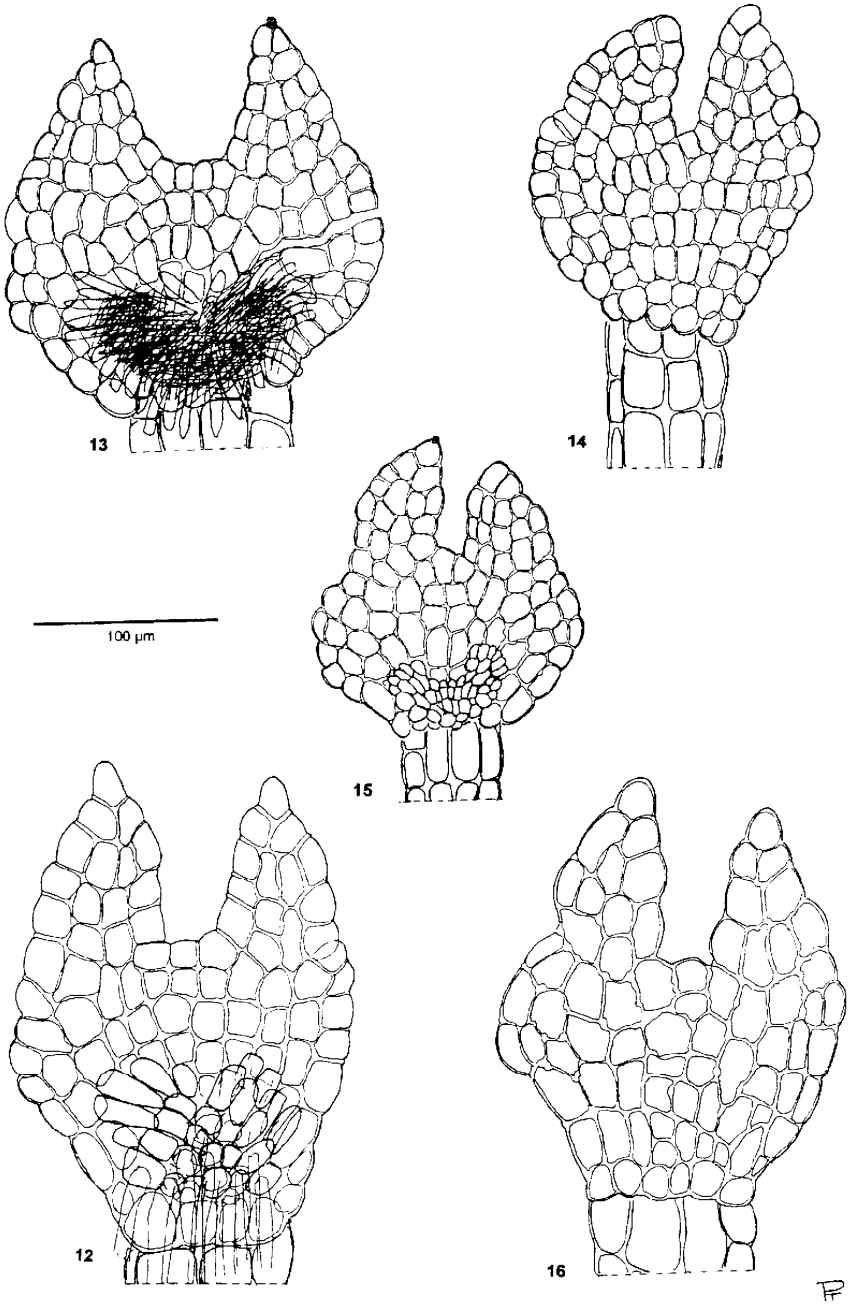

Plate III: *Otolejeunea subana* Pócs. Figs 12-16: Underleaves of the main stem (12-13, 16) and those of the branches (14-15). All drawn from the holotype.

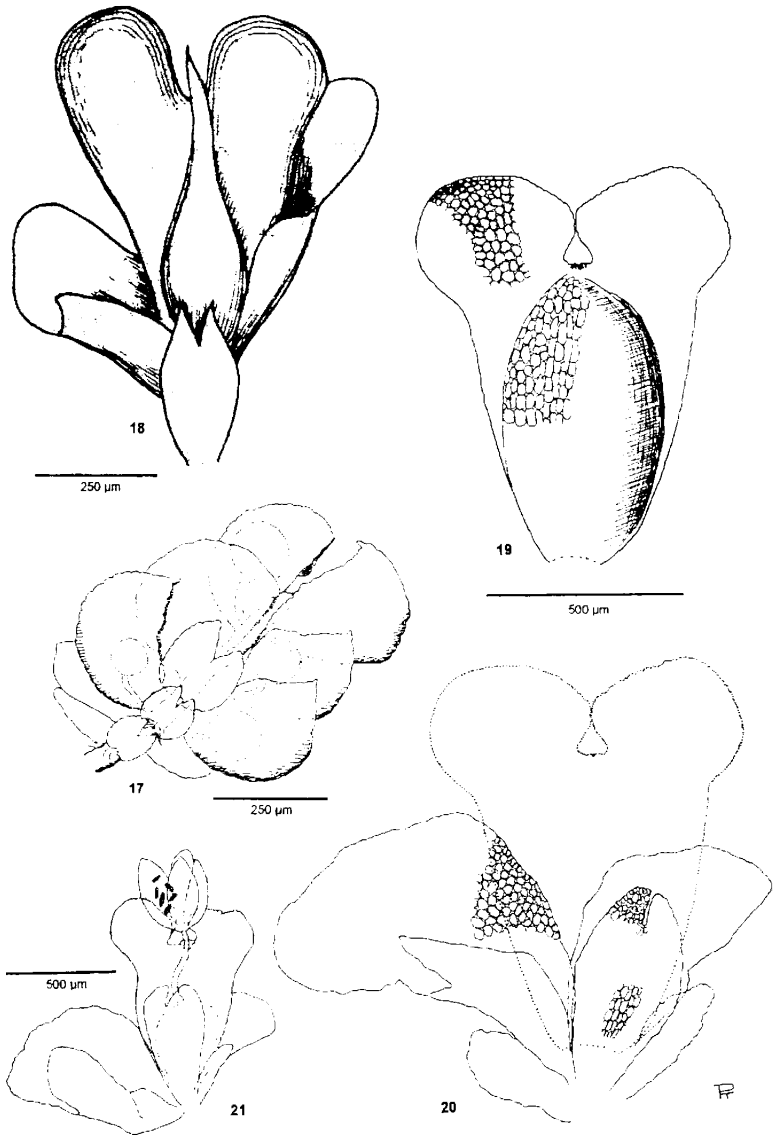

Plate IV: *Otolejeunea subana* Pócs (figs 17, 19-21) and *Otolejeunea rabenorii* Tixier (fig. 18). Fig. 17: male branch of *O. subana.* Fig. 18:. Perianth and perichaetial leaves of *O. rabenorii.* Illustration of Tixier (1988, fig. 2/3), magnified to the size comparable with Fig. 19 and 20. Fig. 19: the perianth, fig. 20: the perichaetial leaves of *O. subana*, showing the position of removed perianth. Fig. 21: Hole perichaetium with a mature sporophyte of *O. subana.* With the exception of fig. 18 all drawn from the holotype of *O. subana.*